

SOME WEEVILS FROM WINTERACEAE AND OTHER HOSTS FROM NEW CALEDONIA

G. KUSCHEL

PLANT PROTECTION, DSIR, PRIVATE BAG,
AUCKLAND, NEW ZEALAND

ABSTRACT

Eleven species of Curculionidae from Winteraceae and other plant families are described from New Caledonia and the Loyalty Islands. **Palontus** new genus seems to be adelphic to *Aneuma* Pascoe from New Zealand; it is placed in the tribe Storeini of the subfamily Curculioninae. There is no evidence to suggest that these weevils occupy a position within Curculionidae comparable to that of Winteraceae in Angiospermae.

The alphabetical sequence of the new species, with the type localities and the hosts, when known, in parenthesis, is:

Palontus bellioli (Tchamba Valley, on *Belliolum*), **P. dispar** (Houailou), **P. exospermi** (Mt Panié, on *Exospermum*, *Belliolum*, *Bubbia* and *Zygogynum*), **P. fidelis** (Maré I., Loyalty Is.), **P. flebilis** (Pic d'Amoa, on *Nothofagus*), **P. iodes** (Poindimié), **P. leucopogonis** (Plum, on *Leocopogon*), **P. nothofagi** (Mt Do, on *Nothofagus*), **P. paniensis** (Mt Panié, on *Belliolum*), **P. turritus** (Table Unio) and **P. varius** (Yahoué).

INTRODUCTION

The small family Winteraceae (Magnoliales) comprises fewer than a hundred species of trees and shrubs occurring in Central and South America, eastern Australia, southeast Asia and Madagascar, New Caledonia, Pacific Islands and New Zealand. It is often regarded as the most archaic family of flowering plants or angiosperms (Cronquist, 1981; Friis, Chaloner and Crane, 1987). As most botanists seem to concur with this view the weevil species found to be associated with flowers and young growth of Winteraceae in New Caledonia and elsewhere were studied to find out if they showed predominantly ancestral or derived features.

The earliest fossil record of Winteraceae, identified from the distinctive pollen grains characterising the family, dates from the Upper Aptian-Lower Albian of Israel, some 105 to 110 million years ago, coinciding with late Lower Cretaceous (Walker, Brenner and Walker 1983). Seed plants of early Mesozoic periods still existing today tend to hold a weevil fauna consisting of species that exhibit a conservative habitus rendering them rather uniform. This fauna possesses relatively high numbers of ancestral character-states or plesiomorphies and shows host associations of a narrow range. This pattern is not evident from the faunas thus far known on the Winteraceae of New Caledonia, New Zealand and Chile, the three areas where the species of this plant family have been searched rather intensively. It appears that the weevils now associated with Winteraceae have little to indicate that they are closer to the groundplan of Curculionidae than others occurring on plant families regarded as evolutionarily more advanced.

Pollen is presumed to have been and continues to be a rich food source for many insects, not least among Coleoptera. Pollen may have been the ancestral diet of adult Cerambycidae, Megalopodidae, Orsodacnidae, Nemonychidae, Belidae, Oxycorynidae and some families of Cucujoidea, and also the diet of the larvae of some of the earliest groups, for instance of Nitidulidae,

Megalopodidae, Nemonychidae (Kuschel, 1983, and in press).

A team of floral biologists from the Department of Biology, Tulane University, New Orleans, Louisiana and the Department of Ecology and Evolution, State University of New York, Stony Brook, New York have visited New Caledonia since 1979 to observe the pollination of Winteraceae.

THE WEEVIL FAUNA
OF THE WINTERACEAE OF
NEW CALEDONIA, NEW ZEALAND
AND CHILE

A brief survey of the rather scarce weevil fauna associated with Winteraceae in New Caledonia, New Zealand and Chile, the only areas of the world where these plants have been sufficiently explored, is offered here in response to the interest that this plant family has for systematists. Although the number of winteraceous species is rather high in New Caledonia (cf. Guillaumin, 1948) only *Exospermum stipitatum*, *Zygogynum baillonii*, *Belliolum rivulare* and *Bubbia pauciflora* have been closely examined by the biologists observing their pollination. These plants have produced three weevil species, all referable to the same genus described below as **Palontus**. Because these three species are very closely related to one or two others associated with *Nothofagus* and a further species occurring on Epacridaceae is only slightly more divergent, the host range of **Palontus** appears to be too wide for it to claim a relict pattern.

In New Zealand, the first fossil Winteraceae occur in the Upper Cretaceous (Mildenhall, 1980), but the current flora of the country has only three rather closely related species of *Pseudowintera* (Allan 1961). Vink (1988) in a recent cladistic analysis, considers this genus to be adelphic (= of sister-group relation-

ship) to the *Zygogynum*-complex of New Caledonia. The only curculionine weevil known from *Pseudowintera* is *Peristoreus dilucidus* (Broun), a rare species whose larva develops in the fruit (May 1987). Although distinctive, the species fits easily into *Peristoreus*, a genus that has about 60 further species associated with plants of such diverse families as Polygonaceae, Elaeocarpaceae, Malvaceae, Epacridaceae, Fabaceae, Cornaceae (*Griselinia*), Oleaceae, Asteraceae and Liliaceae.

Chile has two species of Winteraceae, *Drimys winteri* on the mainland and *D. confertifolia* on the Juan Fernández Archipelago. The mainland *Drimys* has two weevil species associated with young growth, flowers and fruits, one belonging to *Berberidicola*, a genus having several species on *Berberis* (Berberidaceae) and one each on *Ribes* (Grossulariaceae) and *Nothofagus* (Fagaceae), the other belonging to a still undescribed genus somewhat related to *Berberidicola*. The two weevil species belong to the subfamily Molytinae sensu Kuschel (1987), neither exhibiting morphological features or biological characteristics that could be construed as primitive. The same *Drimys winteri* has a further weevil species, *Aegorhinus luteolus* Kuschel whose larva ring-barks live trees usually close to the base of the trunk. This particular species is more closely related to *A. nodipennis* (Hope) associated with Proteaceae, Eucryphiaceae and others than to any of the eight or so Aterpinae known to be confined strictly, as adult and larva, to the *Nothofagus* species of Chile.

The Fernandezian *Drimys confertifolia* holds one weevil species on Robinson Crusoe Island (or Masatierra) and another on Alejandro Selkirk Island (or Masafuera). They belong to the trypetidine genus *Platynanus* (Molytinae) whose species have successfully colonised almost every fern of suitable size and almost all the dicot genera and also the palm *Juania*

australis amongst the monocots. Strangely enough *Platynanus* has no species on *Lactoris fernandeziana*, sole species of the Lactoridaceae, an endemic family to Robinson Crusoe Island that Cronquist (1981) and other botanists have tentatively assigned to Magnoliales. *Platynanus* is related to Trypetidini not from the Neotropical Region but from the southwest Pacific, to *Pogonorhinus* of ferns and *Arecophaga* of palms.

The few depositories for the specimens dealt with in the paper are indicated by their standard abbreviations as given in Arnett and Samuelson (1986). These are:

- BPBM: Bernice P. Bishop Museum, Honolulu, Hawaii.
- ISNB: Institut Royal des Sciences Naturelles de Belgique, 29 rue Vautier, Brussels, Belgium.
- MNHN: Muséum National d'Histoire Naturelle, 45 Rue de Buffon, Paris, France.
- NZAC: New Zealand Arthropod Collection, Plant Protection, DSIR, Private Bag, Auckland, New Zealand.

ACKNOWLEDGMENTS

I wish to thank G. McPherson, O. Pellmyr, and L. B. Thien, members of the team of biologists who provided the specimens from the Winteraceae of New Caledonia, but in particular L. B. Thien for inducing me to write the paper. I am grateful for the loan of specimens to G. A. Samuelson, Bernice P. Bishop Museum, Honolulu and L. Baert, Institut Royal des Sciences Naturelles de Belgique, Brussels, and also for assistance in one way or another to R. C. Craw, J. S. Dugdale, D. W. Helmore, G. M. Herbert, B. A. Holloway, K. H. Jack and J. C.

Watt. Scientists at the Service des Forêts et du Patrimoine Naturel et O.R.S.T.O.M. graciously provided facilities and their time to help collect insects. The Erna and Victor Hasselblad Foundation contributed funds for the habitus drawing of **Palontus exospermi** (Fig. 1).

Palontus new genus (Curculioninae Storeini) (palóntus: from the Greek pále = dust, pollen and ón, óntos = being, creature; gender masculine)

Eyes transverse, flat or nearly so. Funicle 7-segmented; club segments gradually increasing in length. Prothorax truncate at base, constricted at apex to form distinct collar. Scutellum visible, usually conically raised above level of elytra. Elytra parallel at basal half, considerably wider than prothorax at shoulders, with vertical or slightly proclinate base, 10-striate, striae distinctly sulcate also at declivity, 10th finely margined outward for most of length. Hind wings functional. Prosternum with canal, sidewalls of canal continuous, not interrupted or articulated at apical constriction, lacking pit on outside at constriction; fore coxae contiguous or subcontiguous. Femora with or without tooth. Tibiae uncinatae or mucronate. Claws divaricate, laminate.

STRIDULATORY FILES. Present in male as long, narrow iridescent file next to suture or sutural flange on underside at apex of each elytron and 3 (rarely 2) pairs of spiculate plectral granules arranged in 2 parallel rows rather close to median line of tergite 7, Fig. 2; files absent in female.

MALE. Sternite 8 as in Fig. 3, narrowly pigmented at apical margin, pigmented area of blade divided into 2 contiguous or disjunct, strongly transverse plates having row of submarginal setae. Sternite 9 as in Fig. 3, with broad, angulate, asymmetrical arms, with robust,

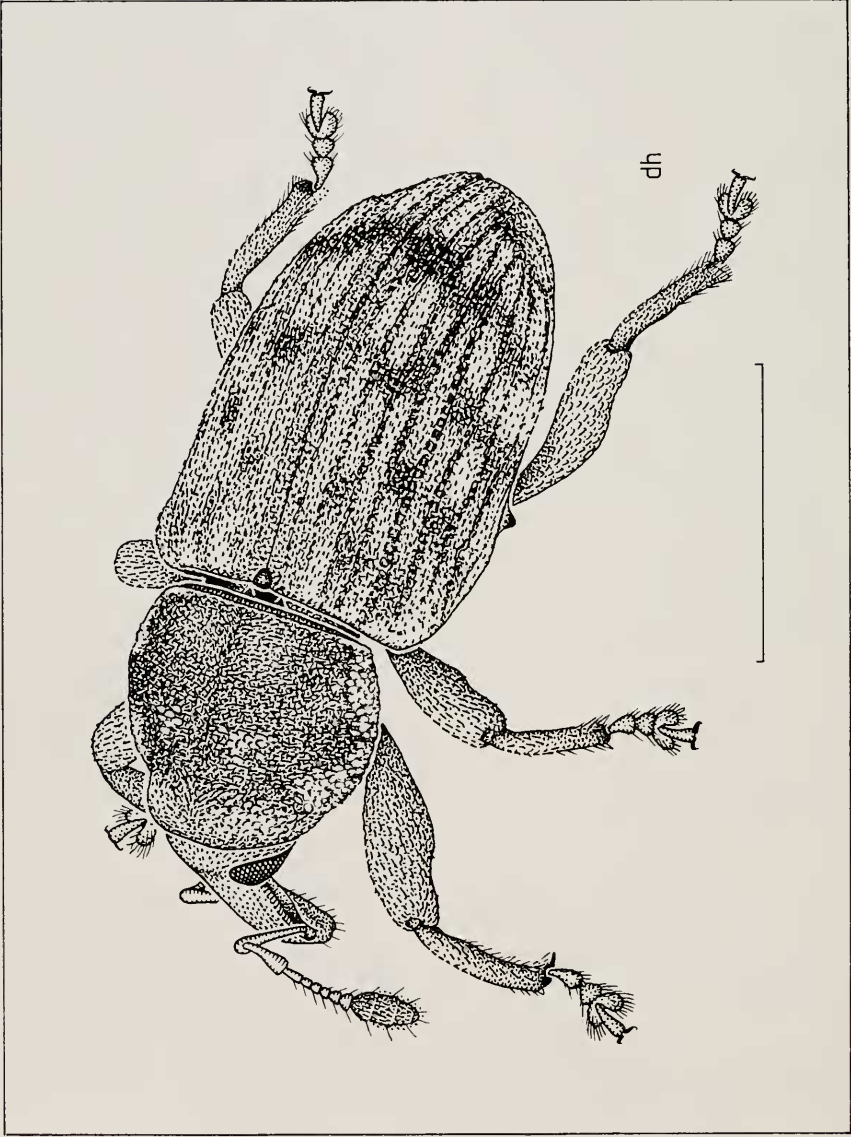


Fig. 1. *Palontus exospermi* n.sp., Mt Pamié, male (Holotype) Scale = 1 mm.

towards the apex strongly curved apodeme. Tegmen with complete ring but no parameres. Aedeagus robust, long, extending into metathoracic cavity, apodemes articulated laterobasally, usually shorter than aedeagal body; internal sac contained inside aedeagal body, unless basal sclerite transformed to long flagellum.

FEMALE. Sternite 8 for all species much as in Fig. 6. Hemisternites elongate, broad at base, tapering toward apex, weakly pigmented, undivided, with pores, without distinct setae; styli well developed, rather long. Vagina and bursa short, very broad, bursa occasionally heavily pigmented to greater or lesser extent. Spermatheca variable in shape, specifically distinctive, with small gland; duct extremely variable in thickness and length, usually thicker at bur-sal end, insertion on bursa specifically characteristic, ventral, apical or dorsal.

TYPE SPECIES. *Palontus exospermi* n.sp.

HOSTPLANTS. Winteraceae, Fagaceae, Epacridaceae.

DISTRIBUTION. New Caledonia and Loyalty Islands.

REMARKS. *Palontus* agrees externally with *Aneuma* from New Zealand but the latter has rather small and coarse stridulatory files, no distinct plectral granules and the internal sac of the aedeagus is long, exposed a good deal between the apodemes although a flagellum is lacking. The larvae of *Palontus* are not known. The larvae of the probably quite closely related genus *Aneuma* are confined to *Pittosporum* (Pittosporaceae), those of *A. fulvipes* Pascoe developing in the flower buds, *A. rubricale* (Broun) living in the open flowers, and *A. fasciatum* (Broun) mining the leaves, the larvae of all three species dropping to the ground to pupate in the soil.

THE RELATIONSHIPS OF *PALONTUS*

The three species of *Palontus* from Winteraceae, the one from *Nothofagus* and a further species from an unknown host share an aedeagus that has distinctly sinuous sides and a basal sclerite that is unusually large and is contained in the aedeagal body in the sense that it does not show up between the apodemes but may be extended beyond the ostium. These features have not been observed elsewhere and consequently are taken to be derived and indicative of monophyly. A flagellum of the size and type shown for the last four species described below is a further derived attribute not seen in possible outgroups. Finally, a conically raised scutellum is a rare occurrence in Curculionidae as a whole, and yet is found in eight out of the eleven species of *Palontus* and nowhere else in Storeini and nearby tribes.

Clark, Whitehead and Warner (1977) classified a group of curculionine weevils, traditionally called Tychiinae, into four tribes. The authors discussed the interrelationships of the Palearctic, Nearctic and Neotropical genera and the tribe Endaeini, left in limbo since Burke (1976) had excluded it from Kissinger's (1964) placement in the Anthonominae. It is yet too early to be positive about the phylogenetic relationships of these and hundreds of other genera now incorporated in Curculioninae (Kuschel 1982). *Palontus* species have divaricate claws, a male sternite 9 with broad, angulate, asymmetrical arms, and elytra with stridulatory files on the underside next to the sutural flange at the tip in males only. These attributes are those of *Storeus* and most Storeini (Lacordaire 1863), a tribe well represented in the Australian Region. The genera that differ from Storeini by having stridulatory files in both

sexes are grouped in Ochyromerini (Voss 1935) and Dinorhopalini (Voss 1936).

The storeine fauna of New Caledonia is rich in genera and species but few are described. *Aporotaxus* and *Gryphosternus* are endemic genera holding the largest known species of the tribe, up to 13 mm long in the case of *Aporotaxus kanalensis* Perroud whose larva develops in the fruit of *Ficus* species. The New Zealand fauna is similarly diverse and rich. A number of storeine genera have a prosternal canal, as *Palontus* has, but then the sidewalls of the canal are distinctly articulated at the apical constriction and a deep pit is showing on the outside by the articulation. *Palontus* has these sidewalls continuous all the way from the fore coxae to the apex and lacks the excavation on the outside, sharing these characters with *Aneuma* from New Zealand and *Rhinidotasia* from Queensland. Although *Palontus* and *Aneuma* resemble each other closely and are likely closely interrelated, it is not possible to be sure that there is an adelphic relationship between them without a more thorough study than the present one, not only of the Storeini, but also of the Ochyromerini, Endaeini, Derelomini and other related tribes. *Rhinidotasia* differs considerably from *Palontus* and *Aneuma* in being rather glabrous and smooth, of rhomboidal, continuous outlines, in having narrowly separated eyes, broadly separated fore and middle coxae, long, slender, almost lineal femora and distinctly striate tibiae.

Stridulatory files on the underside of the elytra seem to have appeared rather late in the superfamily considering that the fossil evidence traces weevils back to the Jurassic (Arnoldi 1977) and, according to Zherichin (1977), even to the Triassic, and that the files are absent in the families of extant Orthoceri.

These are absent also in Brachycerinae, Ithycterinae, Eirrhiniinae, Rhynchophorinae, Entimini and a whole series of "subfamilies" more closely related to the broad-nosed weevils (Adelognatha) than to the long-nosed weevils (Phanerognatha). Files are a common occurrence in the latter group. The adults of the Curculionidae, again sensu Kuschel (1982), have the files, if present, confined to the male sex, except for Ochyromerini and Dinorhopalini; the other groups have them, again if present, almost always in both sexes.

Elytral files appear to be a derived attribute in Curculioninae. The Chilean and Australian Derelomini associated with the male strobili of Araucariaceae have, in the male, a 9th sternite with a large median plate detached from the symmetrical arms, and a tegmen with distinct parameres, and a lack of elytral files. The files are missing also from all other Curculioninae of Chile, including a dozen or so associated with *Nothofagus*, and from the dozen species occurring on *Nothofagus* in New Zealand whilst nearly all of the close to a hundred other Zelandic Curculioninae associated with flowering plants other than *Nothofagus* have them. A rather common weevil on the *Nothofagus* species of New Caledonia agrees generically well with *Neomycta* species of New Zealand, and like all other species of the genus, lacks the elytral files, too. The presence of files in *Palontus* indicates that the genus would not easily qualify as a relict within Storeini.

It is virtually certain that the Curculioninae of flowering plants of Chile are not related to the Storeini of New Zealand and New Caledonia in the sense of an adelphic relationship. New Caledonia and New Zealand are believed to have separated from Austro-Antarctica on a common continental block 78 to 56 million years ago creating

the Tasman Sea (Coleman, 1980) and presumably taking with them some Storeini. Later on, "towards the end of Eocene times, about 37 million years ago, came the parting of the ways for New Caledonia and New Zealand" (Stevens 1981).

As already stated, fossil evidence shows that Winteraceae have existed at least since early Middle Cretaceous times. Although biogeographic patterns of the extant weevil fauna would suggest that representatives of the subfamily Curculioninae should have been around since late Upper Cretaceous, none of the Mesozoic fossils thus far has been recognized as belonging to a species of the long-nosed weevils and only one of the broad-nosed weevils is known (Kuschel 1959). It was described from an area north of Magellan Strait from a Maestrichtian deposit of very late Upper Cretaceous. The recently discovered fossiliferous Orapa deposits of Botswana dated as of Middle to Upper Cretaceous times (McKay & Rayner 1986) contain rather well preserved impressions of weevils but those that are identifiable with some confidence from the photographic copies made available (R. J. Rayner, pers. comm.) belong to families of the evolutionarily less advanced Orthoceri, apparently, to Attelabidae and the family-complex Brentidae/Apionidae.

From the above evidence, the species of *Palontus* now found on Winteraceae in New Caledonia and, similarly, those of *Elleschodes* of the same tribe Storeini pollinating Eupomatiaceae in Australia, show little that might suggest they are relicts within Curculioninae or its tribe Storeini.

KEY TO SPECIES OF *PALONTUS*

- 1. *Metasternum* with prominent tubercle at hind angle. 1. **exospermi**
- *Metasternum* lacking tubercle at hind angle. 2
- 2. *Metepisternum* with 1 row of hairs or scales on posterior half. 3
- *Metepisternum* with 2 or more rows of hairs or scales on posterior half. 4
- 3. Dark markings on basal quarter of elytra consisting of more or less coalescent dots or short stripes on interstriae 3, 5 and 7, one on 5 slightly farther back than others. Elytral vestiture consisting mostly of elliptic or oval scales. 2.0-2.5 mm 2. **bellioli**
- Dark markings on basal quarter of elytra coalescent, forming anteriorly concave arc or extending to interstriae 5. Elytral vestiture consisting mostly of hairs or lineal scales. 1.7 mm. 3. **paniensis**
- 4. Scutellum raised conically high above level of elytra. Femora with strong tooth. 5
- Scutellum flat or only slightly raised, if raised then middle and hind femora unarmed. . 6
- 5. Sides of prothorax pubescent. Elytra variegated with pale reddish and dark brown, with large dark triangular marking in scutellar area and postmedian band across elytra. 2.0-2.5 mm 4. **turritus**
- Sides of prothorax white, covered in dense broad scales. Elytra rusty brown but usually with reddish brown, broad sutural stripe involving first three interstriae from basal quarter to apex, this stripe traversed by darkish band in middle. 2.20-2.45 mm. 5. **nothofagi**

6. All femora with distinct tooth. 7
 - All or some femora lacking tooth. 8
7. Elytra squamose on reddish brown integument. Interstriae not granulose. 1.9-2.4 mm. 6. **flebilis**
 - Elytra pubescent on rusty brown integument. Interstriae finely granulose. 2.7-3.0 mm. 11. **iodes**
8. Scutellum large, flat, shiny. 1.9-2.5 mm. 7. **varius**
 - Scutellum small, raised, dull. 9
9. Elytra with tubercle on intrestria 3. Pronotum humped on middle in lateral view. 2.5-2.8 mm. 8. **dispar**
 - Elytra lacking tubercle on intrestria 3. Pronotum convex on middle in lateral view. 10
10. Elytra distinctly variegated with white, brown and black markings. Rostrum only faintly saddled at base. 2.3-2.6 mm. 9. **fidelis**
 - Elytra not variegated, but with suffused bands across dorsum. Rostrum distinctly saddled at base. 2.6-2.7 mm. 10. **leucopogonis**

1. *Palontus exospermi* n.sp. Figs. 1-8

Integument pale or dark reddish brown. Vestiture forming nebulous designs (Fig. 1), consisting of dark dots across basal third of elytra, loose band across dorsum just beyond middle, usually better defined band across top of declivity, and 1 or 2 dots on each side halfway down declivity.

Head dull, shallowly punctate, usually squamose above and behind eyes. Rostrum in male rather robust, gently

curved, 3 x as long as broad at apex, 0.70-0.75 length of prothorax, dull, with 3 rows of very fine puncta on each side, the rows separated by very fine carinules; prerostrum shiny, finely punctate, broader than long. Rostrum in female more slender, slightly more curved, 4 x as long as broad at apex, 0.88-0.90 length of prothorax, lacking carinules; prerostrum 1.5 x as long as broad. Prothorax broader than long, weakly convex, densely granulose-punctate. Scutellum small, dark, convex but not distinctly raised above level of elytra, finely punctate, sparsely pubescent. Elytra weakly convex across middle and from middle to apex. Fore coxae narrowly separate, pubescence on top slightly longer and ruffled in males. Metasternum with prominent tubercle at hind angle, Fig. 1; metepisternum usually with 2 rows of squamiferous puncta up to middle or beyond. Ventricle 5 in female at most with small and shallow median fovea. Femora with sharp tooth, lower margin fringed with erect hairs in male; tibiae sinuous on lower edge, fore tibiae incurved in male; fore and middle tibiae uncinatate, others mucronate, distal corbels of middle tibiae obliquely ascending.

MALE. Tergite 7 as in Fig. 2. Sternites 8 and 9 as in Fig. 3, plates of sternite 8 contiguous, suffused in middle. Aedeagus as in Figs. 4, 5, constricted before apex; basal sclerite robust, with tubular extension.

FEMALE. Sternite 8 as in Fig. 6. Tip of hemisternites as in Fig. 7. Spermatheca and part of bursa as in Fig. 8; spermathecal duct short, very broad.

LENGTH: 1.9-2.6 mm; width: 0.9-1.3 mm.

DISTRIBUTION: New Caledonia. Mt Panié, 280 m, 6 Dec 1979, 29 specimens on *Exospermum stipitatum* flowers, McPherson; Mt Panié, 300 m, 2 Nov 1983, 23 specimens on *E. stipitatum* flowers, L. Thien; Mt Panié, 300 m, 27 Nov 1983, 1

specimen on *E. stipitatum* flowers, L. Thien; Mt Panié, 440 m, 27 Nov 1983, 1 specimen, Z. Mackeel; Mt Panié, 295 m, 30 Oct 1986, 3 specimens on *E. stipitatum* flowers, O. Pellmyr & R. Brown; Mt Panié, 700 m, 30 Oct 1986, 1 specimen on *Bubbia pauciflora*, O. Pellmyr & R. Brown; Mt Do, 800 m, 5 Jul 1980, 6 specimens on *Zygogynum* flowers, McPherson; Mt Mé Ori, 500 m, 21 Nov 1979, 2 specimens on *E. stipitatum* flowers, McPherson; Mt Mé Ori, 13-14 Dec 1983, 8 specimens on *E. stipitatum* flowers, L. Thien; Mt Dzumac, 800 m, 28-29 Oct 1983, 1 specimen on *Zygogynum baillonii* flower, L. Thien; Rivière Bleu, 150 m, 24 Jul 1980, 7 specimens on *Zygogynum*, McPherson. 82 specimens in all.

Holotype male, 2.5×1.2 mm, Mt Panié, 300 m, 2 Nov 1983, illustrated in Fig. 1, NZAC. Paratypes at BPBM, ISNB, MNHN, NZAC.

HOSTPLANTS. Adults feeding on pollen of *Exospermum stipitatum*, *Bubbia pauciflora* and *Zygogynum baillonii*, all Winteraceae. Vink (1988) prefers to treat the three genera as one and uses the name *Zygogynum*.

REMARKS. *Palontus exospermi* is recognizable instantly by the prominent tubercle on the hind angles of the metasternum shown in Fig. 1 just in front of the hind femora.

2. *Palontus bellioli* n.sp. Figs. 9-11

Integument reddish brown, sterna usually darkened. Vestiture with markings similar to those shown for *P. exospermi* in Fig. 1.

Head dull, finely punctate, pubescent or squamose in part. Rostrum in male slender, gently curved, $4.5 \times$ longer than broad at apex, about as long as prothorax; postrostrum dull, with rows of fine puncta, the areas between the rows slightly raised to very fine carinules; prerostrum shiny, finely punctate, about as long as broad. Ros-

trum in female more slender, slightly more curved, $6.5 \times$ longer than broad at apex, about $1.5 \times$ length of prothorax; postrostrum very finely punctate, lacking carinules; prerostrum 2 or 3 \times longer than broad. Pronotum densely and coarsely punctate. Scutellum small, conically raised slightly above level of elytra, dull. Elytra moderately convex across middle, distinctly convex in lateral view between basal third and apex. Fore coxae contiguous or nearly so. Metasternum lacking tubercle on hind angles; metepisternum with single row of squamiferous puncta for most of length. Ventricle 5 with rather large and deep median fovea at apex in female. Femora armed with small tooth, occasionally very small, hardly noticeable on hind femora. Tibiae straight on lower edge; fore tibiae straight in male; fore and middle tibiae uncinately, others mucronate; distal corbels of middle tibiae not distinctly ascending.

MALE. Aedeagus as in Figs. 9, 10, apical half shaped like long, truncate spatula; basal sclerite large, robust, with dorsal tubular extension.

FEMALE. Spermatheca as in Fig. 11, duct long and fine.

LENGTH: 2.0-2.5 mm; width: 1.0-1.15 mm.

DISTRIBUTION: New Caledonia. Tchamba Valley, 40 m, 1 Nov 1983, 6 specimens on *Belliolum rivulare*, L. Thien; Thy Valley, 28 Sep 1979, 2 specimens on *Belliolum* cf. *crassifolium*, McPherson.

Holotype male, 2.1×1.0 mm, Tchamba Valley, NZAC. Paratypes at BPBM and NZAC.

HOSTPLANTS. *Belliolum rivulare*, *B. cf. crassifolium*.

REMARKS. A single row of scales on the metepisternum distinguishes *P. bellioli* and *P. paniensis* from all others; these two species are compared more closely in the following description.

3. *Palontus paniensis* n.sp. Figs. 12, 13

Hardly distinguishable from *P. bellioli* on external characters except perhaps for smaller size and for design patterns on elytra. Markings consisting of suffused darkish arc extending from basal quarter of suture forward to interstria 5, suffused band across dorsum just beyond middle and very faint darkening on each side at top of declivity. Rostrum slightly more curved, rostral carinules less distinct, elytral vestiture finer by consisting mostly of hairs or lineal scales.

MALE. Aedeagus as in Figs. 12, 13, distinctly different in shape and armature from all other species; basal sclerite lacking tubular extension.

FEMALE. Unknown

LENGTH: 1.7 mm; width: 0.8 mm

DISTRIBUTION: New Caledonia. Mt Panié, 450 m, 20 Jul 1980, 1 male on *Belliolum* sp., McPherson.

Holotype male, data as above, NZAC.

REMARKS. *P. paniensis* is defined by the aedeagal features and the characters indicated in the key to species.

HOSTPLANT. *Belliolum* sp.

4. *Palontus turritus* n.sp. Figs. 14, 15

Dark or reddish brown, but patterns variable, elytra variegated but rather suffused, with large triangular dark patch in scutellar area and postmedian band across dorsum. Vestiture consisting of pubescence and scaling, latter on paler areas.

Head dull, slightly asperate. Rostrum robust, gently curved, $3.5 \times$ longer than broad at apex, 0.75 the length of prothorax, carinulate; prerostrum strongly transverse, nearly twice as broad as long. Prothorax as long as broad, weakly rounded on sides, densely and coarsely punctate, each punctum with raised margin on posterior half. Scutellum conically protrud-

ing well above level of elytra. Fore coxae subcontiguous. Metepisternum with 2 ill-defined rows of puncta. All femora with rather long sharp tooth. Fore tibiae straight but lower edge slightly sinuous, all tibiae with rather small mucro.

MALE. Sternite 8 with contiguous plates. Aedeagus as in Figs. 14, 15, shape and armature highly characteristic, the ostial margins finely and sparsely ciliate.

FEMALE. Unknown.

LENGTH: 2.0-2.5 mm; width: 1.0-1.15 mm.

DISTRIBUTION: New Caledonia. Table Unio, 550-1000 m, 16 Oct 1978, 2 males, J. C. Watt; Mt Rembai, 700 m, 18 Oct 1978, 1 male, J. C. Watt; Mt Do, 1000 m, 31 Oct 1978, 1 male, J. C. Watt; Noumea, 1 male, Coll. Fauvel.

Holotype male, 2.4×1.15 mm, Table Unio, NZAC. Paratypes at BPBM, ISNB, NZAC.

HOSTPLANT. Unknown.

REMARKS. *P. turritus* resembles closely *P. bellioli* but may be distinguished readily by a highly towered up (= *turritus*) scutellum, strongly dentate femora and a very distinctive aedeagus.

5. *Palontus nothofagi* n.sp. Figs. 16-19

Integument reddish brown on rostrum, prothorax, first 3 interstriae from basal quarter of elytra, underside and legs; rusty brown on head capsule and remainder of elytra. Vestiture pubescent except for white scales on sides of head behind eyes, sides of prothorax, elytral suture at basal quarter, pleurites and sides of metasternum.

Head dull, shallowly punctate, slightly asperate. Rostrum similar in both sexes, dull, nearly straight, at least $3 \times$ longer than broad at apex, 0.75 length of prothorax, not carinulate, rows of hairs or lineal scales slightly more distinct in male. Prothorax, about

as long as broad, weakly rounded on sides, densely and coarsely punctate, puncta rimmed at posterior half. Scutellum raised well above level of elytra. Ventrite 5 with shallow median fovea near apex in female. All femora with strong, sharp tooth; tibiae slightly sinuous on lower edge, fore and middle tibiae uncinata, others mucronate, middle tibiae with obliquely ascending distal comb.

MALE. Tergite 7 with 2 pairs of distinct granules. Sternite 8 with contiguous plates. Aedeagus as in Figs. 16, 17, distinctive in dorsal and lateral views.

FEMALE. Hemisternal apex as in Fig. 18, stylus unusually long. Bursa with partly folded sclerite, Fig. 19. Spermatheca as in same Fig. 19, duct very fine at spermathecal end, very wide at bursal end.

LENGTH: 2.2-2.6 mm; width: 1.05-1.20 mm.

DISTRIBUTION: New Caledonia. Mt Do, 900-1030 m, 22 Oct 1978, 2 pairs on *Nothofagus codonandra*, G. Kuschel; Pic du Pin, 6 Oct 1978, 1 female by beating, J. C. Watt.

Holotype male, 2.2 × 1.05 mm, Mt Do, NZAC. Paratypes at BPBM and NZAC.

HOSTPLANTS. *Nothofagus codonandra* and, presumably, *N. aequilateralis*, the only southern beech growing at Pic du Pin.

REMARKS. *P. nothofagi* stands out in colour and vestiture from all others of the genus.

6. *Palontus flebilis* n.sp. Fig. 20

Integument reddish brown. Vestiture consisting mostly of small yellowish scales on dorsal surface, of larger white scales on underside, elytra crossed by faint band of dots on basal third, band just behind middle and one at top of declivity.

Head dull, alutaceous, very shal-

lowly, indistinctly punctate, not asperate; pubescent or scaly. Rostrum moderately shiny, weakly curved, slightly more than 3 × longer than broad at apex, about 0.93 length of prothorax, carinate between rows of puncta; prorsotrum half as long again as broad. Prothorax slightly transverse, 1.10-1.12 × broader than long, moderately convex in lateral view, densely punctate. Scutellum small, dull, raised to low cone. Fore coxae subcontiguous. Femora with strong, sharp tooth on fore and middle pairs, with smaller tooth on hind pair; fore and middle tibiae uncinata, hind ones mucronate.

MALE. Unknown.

FEMALE. Spermatheca as in Fig. 20, with large, wrinkled extension toward very small gland; duct fine throughout, short, inserted terminally on bursa.

LENGTH: 1.9-2.4 mm; width: 0.95-1.15 mm.

DISTRIBUTION: New Caledonia. Pic d'Amoa, 450-500 m, nr Poindimié, 26 Oct 1978, 2 females on *Nothofagus aequilateralis*, G. Kuschel.

Holotype female, 2.4 × 1.15 mm and paratype at NZAC.

HOSTPLANT. *Nothofagus aequilateralis*.

REMARKS. Although the spermatheca of *P. flebilis* differs considerably from that of the other species, indications are that *P. flebilis* is related to the preceding *P. nothofagi* more closely than to the following species. All efforts and time spent to secure more specimens were in vain, hence the species name flébilis, Latin for pitiable.

7. *Palontus varius* n.sp. Figs. 21, 22, 27.

Integument reddish brown but elytra always, and other parts often, darkened to dark or blackish brown, especially head and sterna. Vestiture consisting of pubescence and scaling, but scales usually dominant on elytra, form-

ing variegated patterns on elytra, white or yellowish scales mainly at base of interstria 3, on humeral area and on apical third where usually forming rather broad band across top of declivity.

Head dull, alutaceous, indistinctly, and very shallowly punctate, not asperate, pubescent except on frons. Rostrum slender, curved; in male dull, $4.5 \times$ longer than broad at apex, at least $1.10 \times$ length of prothorax, finely carinulate between rows of puncta; pre-rostrum nearly twice as long as wide in male, fully twice as long as wide in female. Prothorax distinctly transverse, $1.2-1.3 \times$ wider than long. Scutellum large, flat, shiny. Fore coxae contiguous. Femora unarmed or tooth on front ones appearing as small granule. Tibiae straight, fore and middle pair with small mucro, hind pair indistinctly mucronate.

MALE. Sternite 8 narrowly divided into 2 plates. Aedeagus as in Figs. 21, 22, of characteristic shape in dorsal and lateral views, body elongate, hardly tapering toward apex; lacking distinct basal sclerite but internal sac with rather striking longitudinal folds.

FEMALE. Bursa and spermatheca as in Fig. 27, bursa with large sclerite, spermathecal duct short, fine at both ends.

LENGTH: 1.9-2.5 mm; width: 1.0-1.3 mm.

DISTRIBUTION: New Caledonia. Yahoué, 22 Jan 1963, 1 male, G. Kuschel; Yahoué, 11 Oct 1978, 1 male by sweeping, J. S. Dugdale; between Noumea and Bourail, 2 pairs, Coll. Fauvel.

Holotype male, 2.05×1.05 mm, Yahoué, NZAC. Paratypes at ISNB and NZAC.

HOSTPLANT. Unknown.

REMARKS. Distinguishable from all other species of the genus by having a

large, flat, shiny scutellum. The lack of a distinct basal sclerite is thus far unique in the genus.

8. *Palontus dispar* n.sp. Figs. 23, 24

Integument dark reddish brown. Vestiture consisting of pubescence and some pale scales, scales mainly on base of interstria 3, behind humeral callus, before middle of elytra and on underside.

Head dull, densely but very shallowly punctate, squamose. Rostrum moderately robust, dull or slightly shiny, curved, about $4 \times$ as long as broad at apex, slightly shorter than prothorax, rather coarsely punctate, areas between rows of puncta carinulate; pre-rostrum as long as broad. Prothorax $1.1 \times$ wider than long, strongly rounded on sides, so strongly convex as to appear humped on middle in lateral view, densely and coarsely punctate. Scutellum small, dull, slightly to distinctly raised anteriorly. Elytra rather broad, convex throughout in lateral view, interstria 3 on middle with elongated tubercle topped with black vestiture. Fore coxae contiguous. Fore femora with small tooth, others at most asperate. Fore and middle tibiae with small mucro, hind tibiae with very small mucro.

MALE. Sternite 8 with plates rather broadly separated. Aedeagus as in Figs. 23, 24, basal sclerite modified to flagellum as long as entire aedeagus.

FEMALE. Unknown.

LENGTH: 2.6-2.8 mm; width: 1.35-1.60 mm.

DISTRIBUTION: New Caledonia. Houailou, 30 Oct 1978, 1 male beaten at night, J. C. Watt; Baie du Prony, 1 male, Coll. Fauvel; Plaine des Lacs, 1959, 1 male, N. L. H. Krauss.

Holotype male, 2.6×1.35 mm,

Houailou, NZAC. Paratypes at BPBM, and ISNB.

HOSTPLANT. Unknown.

REMARKS. Readily separated from all other species of the genus by the presence of a hump on the pronotum and tubercle on the elytra giving the weevil a rather disparate facies expressed with the Latin adjective 'dispar'.

9. *Palontus fidelis* n.sp. Figs. 25, 26, 28

Colour and patterns much as in two preceding species.

Head dull, shallowly punctate, squamose. Rostrum slender, curved, in male slightly more than $3.5 \times$ longer than broad at apex, 0.90 length of prothorax, carinulate, apical part (pre-rostrum) about as long as wide; rostrum in female slightly more than $4 \times$ as long as wide, about 0.95 length of prothorax, also carinulate between rows of puncta, apical part about twice as long as wide. Prothorax $1.15-1.20 \times$ broader than long, strongly rounded on sides, distinctly convex in lateral view. Scutellum small, dull, raised to low point. Fore coxae contiguous. All femora unarmed. Mucro small on fore and middle tibiae, indistinct on hind tibiae.

MALE. Aedeagus as in Figs. 25, 26, slightly asymmetrical at apex, with long flagellum.

FEMALE. Bursa and spermatheca as in Fig. 28, duct very long, thicker at bursal end, inserted on bursal apex.

LENGTH: 2.3-2.6 mm; width: 1.20-1.35 mm.

DISTRIBUTION: Loyalty Islands. Maré I., La Roche, March 1959, 1 male, 3 females, N. L. H. Krauss.

Holotype male, 2.5×1.3 mm, data as above, BPBM. Paratypes at BPBM and NZAC.

HOSTPLANT. Unknown.

REMARKS. Similar externally and in-

ternally to *P. dispar* but lacking the humped prothorax and tuberculate elytra of the latter. The species name 'fidélis' is Latin for loyal.

10. *Palontus leucopogonis* n.sp. Figs. 29, 30

Integument uniformly reddish brown. Vestiture consisting mainly of silvery grey scales with few subdued darker markings, forming 3 stripes on pronotum, median band across middle of elytra, small area at suture on top of declivity and a sutural stripe at basal third.

Head dull, densely covered in white and brown scales. Rostrum slender, $4.2-4.3 \times$ as long as broad at apex, 0.90-0.95 length of prothorax, distinctly saddled against frons, curved, dull, carinulate between rows of puncta; pre-rostrum only slightly longer than broad. Prothorax as long as broad, gently rounded on sides, moderately convex in lateral view. Scutellum small, dull, raised slightly above level of elytra. All femora unarmed or fore femora alone with minute tubercle. All tibiae distinctly mucronate but mucro on hind pair smaller.

MALE. Sternite 8 with broadly separate plates. Aedeagus as in Figs. 29, 30, with flagelliform basal sclerite, the flagellum hardly longer than aedeagal body.

FEMALE. Unknown.

LENGTH: 2.6-2.7 mm; width: 1.3 mm

DISTRIBUTION: New Caledonia. Plum, 8 Oct 1978, 2 males on *Leucopogon* (*Cyathodes* on label), G. Kuschel.

Holotype male, 2.6×1.3 mm, data as above, and paratype at NZAC.

HOSTPLANT. *Leucopogon* sp., with silvery white leaves on the underside (Epacridaceae).

REMARKS. *P. leucopogonis* is characterised by its frontorostral area being distinctly depressed as a saddle seat and the silvery white scaling.

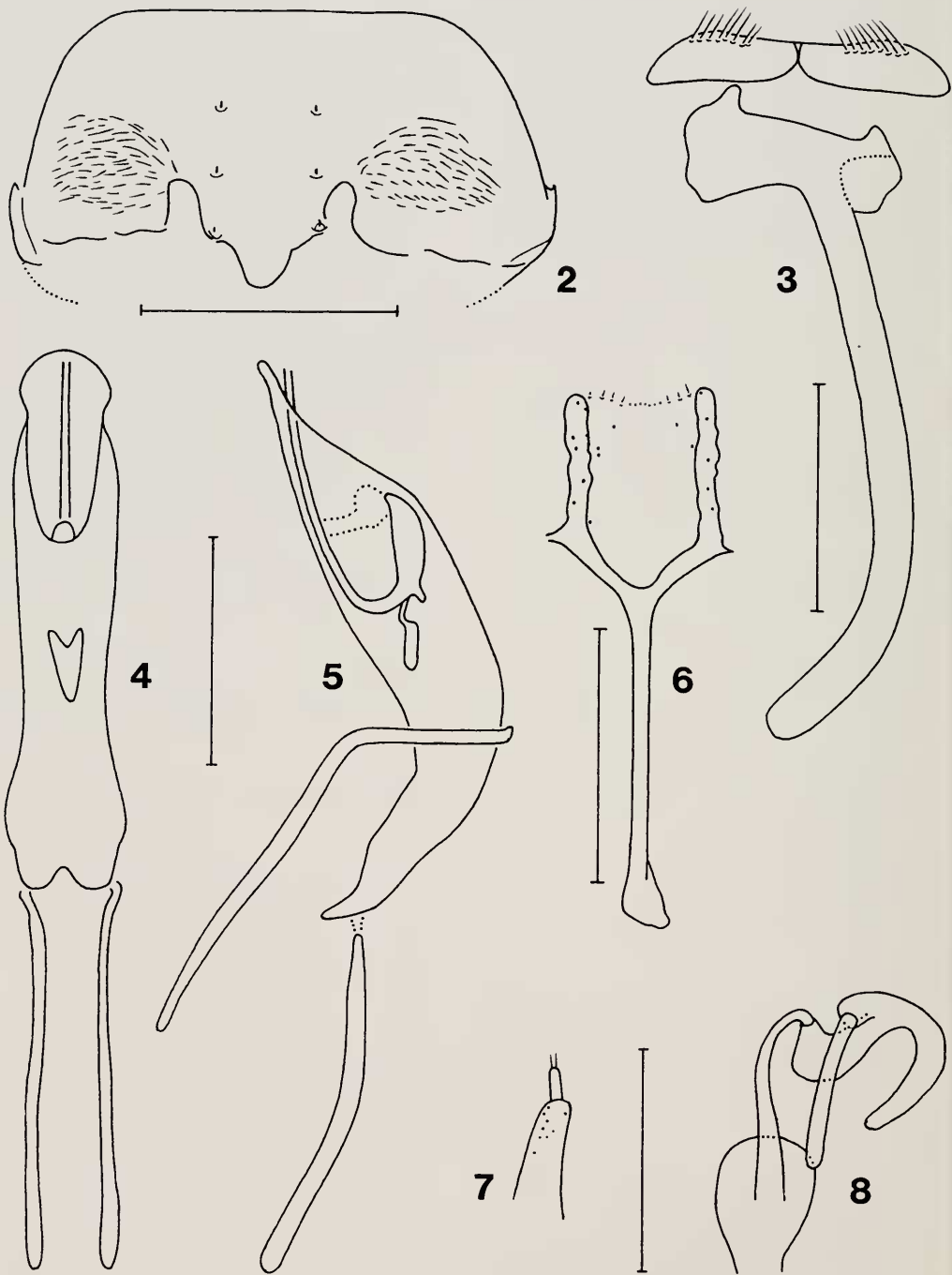
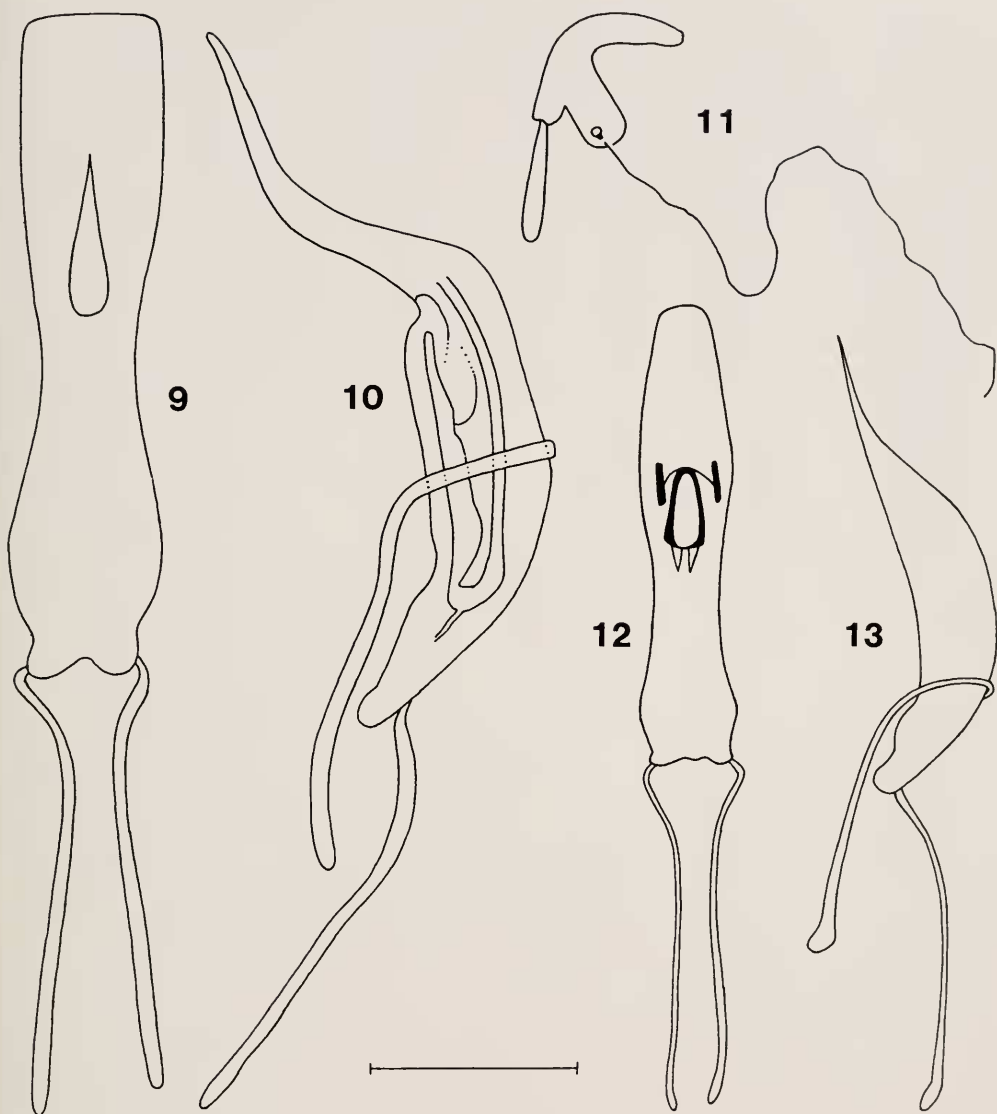


Fig. 2-8 *Palontus exospermi* n.sp., Mt Panić, 2. tergite 7 of male, dorsal; 3. sternites 8 and 9, ventral; 4. aedeagus, dorsal; 5. aedeagus, lateral; 6. sternite 8 of female, ventral; 7. hemisternal apex; 8. spermatheca and part of bursa. Scales = 0.2 mm.

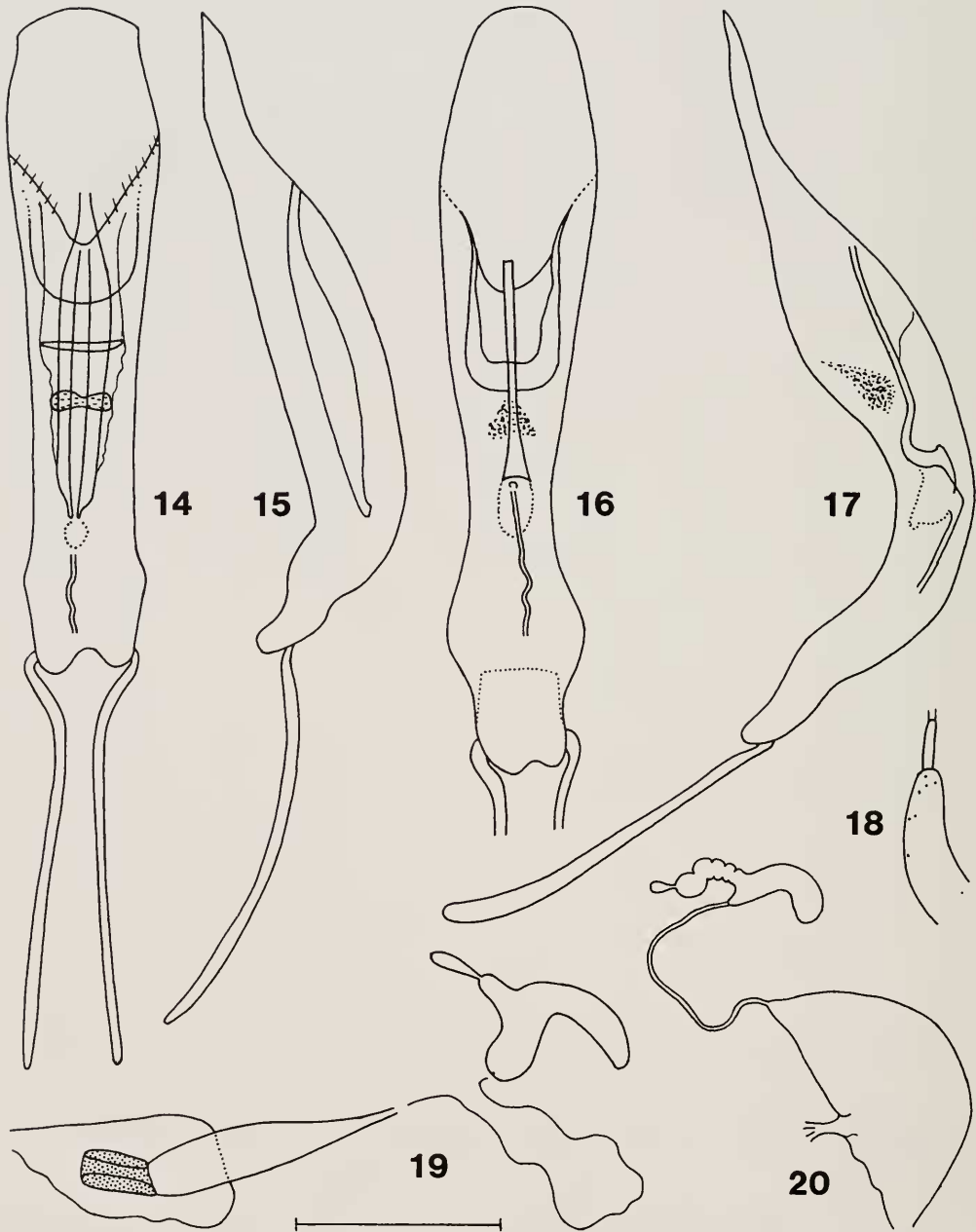


Figs. 9-13. *Palontus bellioli* n.sp., Tchamba Valley: 9. aedeagus, dorsal; 10. aedeagus, lateral; 11. spermtheca with full length of duct. *P. paniensis* n.sp., Mt Panié: 12. aedeagus, dorsal; 13. aedeagus, lateral. Scale = 0.2 mm.

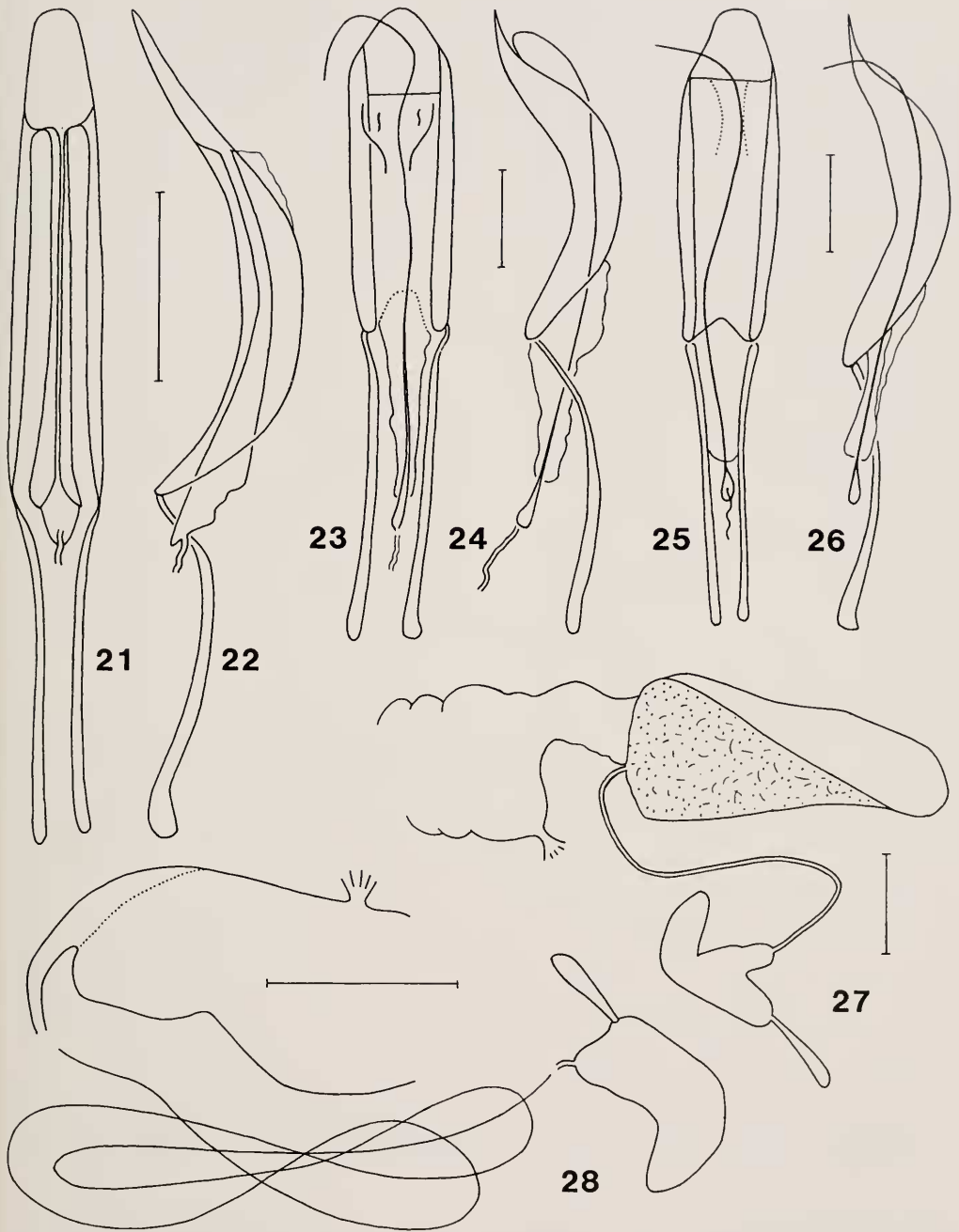
11. *Palontus iodes* n.sp. Figs. 31-33.

Integument reddish brown, sterna usually darker, discretely pubescent with fine, usually whitish hairs, these slightly coarser on sides of pronotum, at base of interstria 6, across top of declivity there forming narrow pale band.

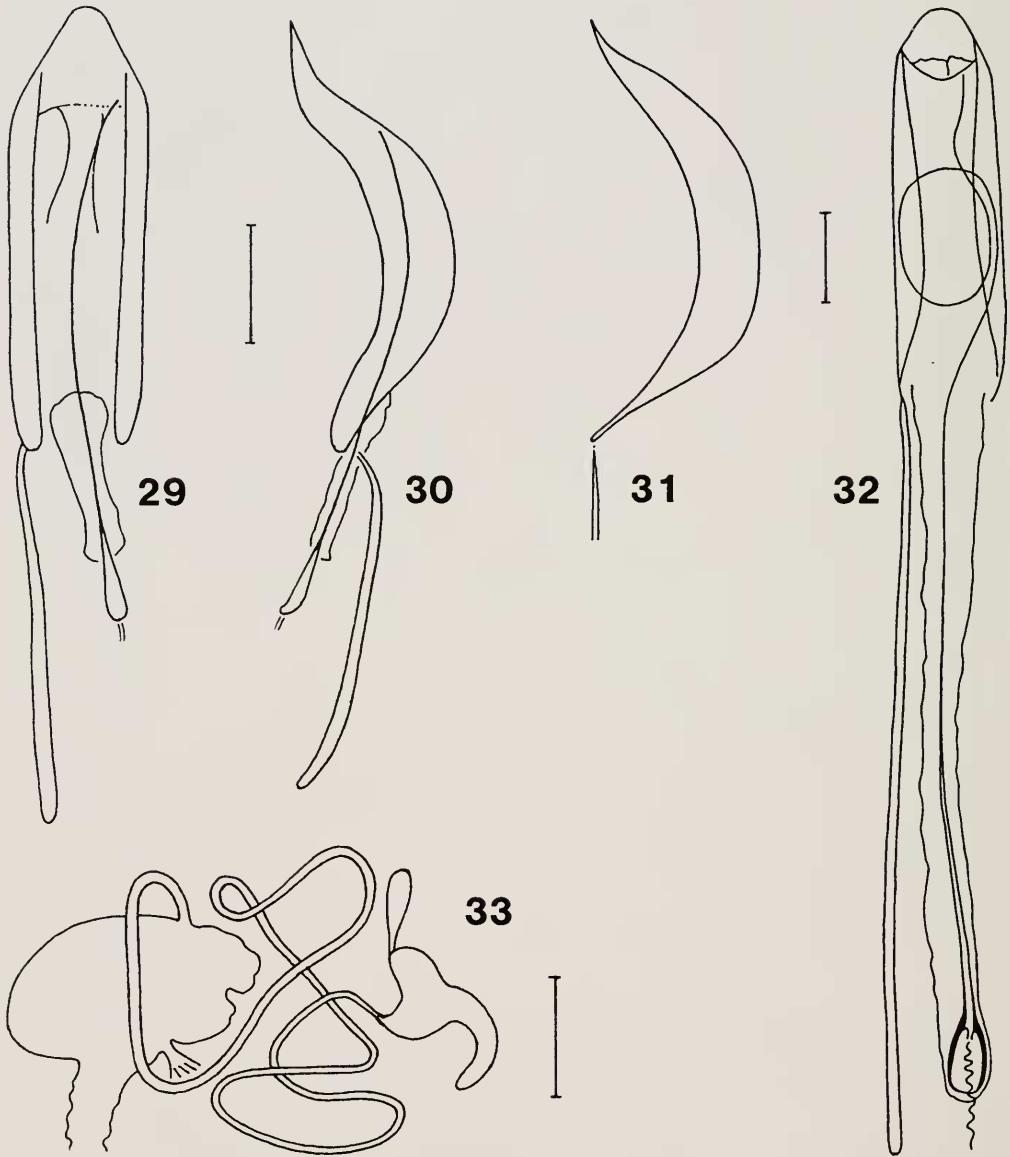
Head dull, densely, shallowly punctate. Rostrum robust, gently curved, $2.5-2.6 \times$ as long as broad at apex, about 0.80 length of prothorax, not carinate. Prothorax nearly $1.10 \times$ broader than long, gently rounded on sides, almost flat dorsally in lateral view,



Figs. 14-20. *Palontus turritus* n.sp., Mt Do: 14. aedeagus, dorsal; 15. aedeagus, lateral. *P. nothofagi* n.sp., Mt Do: 16. aedeagus, dorsal; 17. aedeagus, lateral; 18. hemisternal apex; 19. spermatheca and part of bursa. *P. flebilis* n.sp., Pic d'Amoa: 20. spermatheca and bursa. Scale = 0.2 mm.



Figs. 21-28. *Palontus varius* n.sp., Noumea/Bourail: 21. aedeagus, dorsal; 22. aedeagus, lateral; 27. spermatheca and bursa. *P. dispar* n.sp., Houailou: 23. aedeagus, dorsal; 24. aedeagus, lateral. *P. fidelis* n.sp., I. Maré: 25. aedeagus, dorsal; 26. aedeagus, lateral; 28. spermatheca and bursa. Scales = 0.2 mm.



Figs. 29-33. *Palontus leocopogonis* n.sp., Plum: 29. aedeagus, dorsal; 30. aedeagus, lateral. *P. iodes* n.sp., Poindimié: 31. aedeagus, lateral; 32. aedeagus, dorsal; 33. spermatheca and bursa. Scales = 0.2 mm.

densely punctate with raised intervals, rendering it rugose. Scutellum small, dull, flat or nearly so. Elytra weakly convex across basal half, dorsum straight for most part in lateral view. Fore coxae contiguous or nearly so. All femora with strong, sharp tooth. Tibiae slightly sinu-

ous on lower edge, fore and middle pairs unciniate, hind pair mucronate.

MALE. Sternite 8 with contiguous plates. Aedeagus as in Figs. 31, 32; apodemes twice as long as aedeagal body; internal sac with very long flagellum, this longer than entire aedeagus.

FEMALE. Bursa and spermatheca as in Fig. 33, spermathecal duct wider at bursal end and inserted dorsally on bursa.

LENGTH: 2.7-3.0 mm; width: 1.30-1.45 mm.

DISTRIBUTION: New Caledonia. Poindimié, 11 Feb 1963, 8 specimens, C. M. Yoshimoto and G. Kuschel.

Holotype male, 2.7 × 1.3 mm data as above, NZAC. Paratypes at BPBM and NZAC.

HOSTPLANT. Unknown.

REMARKS. *P. iodes* is distinguished by having a much more robust rostrum than any of the other species of the genus and by its distinctive colour. It differs considerably also by being the only species that has an aedeagus whose body is shorter than the apodemes. The specific epithet 'iodes' is Greek for rusty.

LITERATURE CITED

- ALLAN, H. H. 1961. Flora of New Zealand 1: LIV + 1085 pp. R. E. Owen, Wellington.
- ARNETT, R. H. and G. A. SAMUELSON. 1986. The insect and spider collections of the world. USA. 220 pp.
- ARNOLDI, L. V. 1977. Rhynchophora (in part), Mesozoic beetles. Trudy Paleontological Institute 161: 142-176, 196-198.
- BURKE H. R. 1976. Bionomics of the anthonomine weevils. Annual Review of Entomology 21: 283-303.
- CLARK, W. E., D. R. WHITEHEAD and R. E. WARNER. 1977. Classification of the weevil subfamily Tychiinae, with a new genus and species, new combinations, and new synonymy in Lignyodini (Coleoptera:Curculionidae). The Coleopterists Bulletin 31: 1-18.
- COLEMAN, P. G. 1980. Plate tectonics background to biogeographic development in the southwest Pacific over the last 100 million years. Palaeogeography, Palaeoclimatology, Palaeoecology 31: 105-121.
- CRONQUIST, A. 1981. An integrated system of classification of flowering plants. Columbia University Press. XVIII + 1262 pp.
- FRIIS, E. M., W. G. CHALONER and P. R. CRANE. 1987. Introduction to Angiosperms. In: The Origins of Angiosperms and their Biological Consequences, Ed. E. M. Friis, W. G. Chaloner and P. R. Crane. pp. 1-15. Cambridge University Press, NY. 358 pp.
- GUILLAUMIN, A. 1948. Flore analytique et synoptique de la Nouvelle-Calédonie: Phanerogames. Flore de la France d'Outre-Mer, Paris. 369 pp.
- KISSINGER, D. G. 1964. Curculionidae of America north of Mexico: a key to the genera. V + 143 pp. S. Lancaster, MA.
- KUSCHEL, G. 1959. Un curculiónido del Cretáceo Superior, primer insecto fósil de Chile. Investigaciones Zoológicas Chilenas 5: 49-54.
- KUSCHEL, G. 1982. Apionidae and Curculionidae (Coleoptera) from the Poor Knights Islands, New Zealand. Journal of the Royal Society of New Zealand 12: 273-282.
- KUSCHEL, G. 1983. Past and present of the relict family Nemonychidae. Geographical 7.6: 499-504.
- KUSCHEL, G. 1987. The subfamily Molytinae (Coleoptera:Curculionidae): General notes and descriptions of new taxa from New Zealand and Chile. New Zealand Entomologist 9: 11-29.
- KUSCHEL, G. (in press). Palophaginae, a new subfamily for leaf-beetles feeding as adult and larva on araucarian pollen in Australia (Coleoptera:Megalopodidae). Invertebrate Taxonomy.
- LACORDAIRE, T. 1963. Genera des Coléoptères 6: 1-637. Paris.
- MCKAY, I. J. and R. J. RAYNER, 1986. Cretaceous fossil insects from Orapa, Botswana. Journal of the Entomological Society of South Africa 49: 7-17.
- MAY, B. M. 1987. Immature stages of Curculionoidea (Coleoptera): Rearing records 1964-1986. New Zealand Entomologist 9: 44-56.
- MILDENHALL, D. C. 1980. New Zealand Late Cretaceous and Cenozoic plant biogeography: a contribution. Palaeogeography, Palaeoclimatology, Palaeoecology 31: 197-233.
- STEVENS, G. R. 1981. New Zealand adrift. A. H. & A. W. Reed Ltd., Auckland. XXII + 442 pp.
- VINK, W. 1988. Taxonomy in Winteraceae. Taxon 37: 691-698.
- VOSS, E. 1935. Fünf Rüssler aus den Tribus Prionomerini und Anthonomini von Java (Col. Curc.) Entomologische Blätter 31: 228-233.
- VOSS, E. 1936. Über die Tribus Scolopterini sowie einige verwandte Gattungen und Gruppen von Neu-Seeland. Arbeiten über morphologische und taxonomische Entomologie aus Berlin-Dahlem 3: 60-62, 110-121.
- WALKER, J. W., G. J. BRENNER and R. G. WALKER. 1983. Winteraceous pollen in the Lower Cretaceous of Israel: early evidence of a magnolialean angiosperm family. Science 220: 1273-1275.
- ZHERICHIN, V. V. 1977. Rhynchophora (in part), Mesozoic beetles. Trudy Paleontological Institute 161: 176-182, 198.